

# **EAGLE™**

**Energy Access Gateway Link to Ethernet**

# **REST API Manual**

Version 1.1  
July 2015

Copyright © 2015 by RAINFOREST AUTOMATION, INC (“RFA”). All rights reserved.  
No part of this manual may be reproduced or transmitted in any form without the expressed, written permission of RFA.

Under copyright law, this manual or the software described within, cannot be copied, in whole or part, without the written consent of the manufacturer, except in the normal use of the software to make a backup copy. The same proprietary and copyright notices must be affixed to any permitted copies as were affixed to the original. This exception does not allow copies to be made for others, whether or not sold, but all of the material purchased (with all backup copies) can be sold, given, or loaned to another person. Under the law, copying includes translating into another language or format.

Rainforest Automation may have patents, patent applications, trademarks, copyrights, or other intellectual property rights covering subject matter in this document. Except as expressly provided in any written license agreement from Rainforest Automation, the furnishing of this document does not give you any license to these patents, trademarks, copyrights, or other intellectual property.

**Trademarks**

Third-party brands and company Names mentioned herein may be trademarks and/or registered trademarks of their respective companies and are the sole property of their respective manufacturers.

**Notice**

The author(s) assumes no responsibility for any errors or omissions that may appear in this document nor does it make a commitment to update the information contained herein.

# EAGLE™ – Energy Access Gateway Link to Ethernet

 RFA-Z109  
 Version 1.1

## REST API

### Table of Contents

<b>OVERVIEW</b> .....	<b>4</b>
EAGLE™ REST Interface.....	4
Communications Model .....	4
Data Structures.....	5
1. Commands .....	5
2. Notifications .....	7
3. HTTP 1.1 .....	8
4. JSON .....	9
<b>COMMANDS &amp; NOTIFICATIONS</b> .....	<b>10</b>
1. Command: <i>get_network_info</i> .....	10
2. Notification: <i>NetworkInfo</i> .....	10
2a. <i>NetworkInfo</i> (Protocol = ZigBee).....	10
3. Command: <i>get_network_status</i> .....	12
4. Notification: <i>NetworkStatus</i> .....	12
4a. <i>NetworkStatus</i> (Protocol = ZigBee).....	12
5. Command: <i>get_instantaneous_demand</i> .....	13
6. Notify: <i>InstantaneousDemand</i> .....	14
7. Command: <i>get_price</i> .....	14
8. Notify: <i>PriceCluster</i> .....	15
9. Command: <i>get_message</i> .....	15
10. Notify: <i>MessageCluster</i> .....	16
11. Command: <i>confirm_message</i> .....	17
12. Command: <i>get_current_summation</i> .....	17
13. Notify: <i>CurrentSummation</i> .....	17
14. Command: <i>get_history_data</i> .....	18
15. Notify: <i>HistoryData</i> .....	19
16. Command: <i>set_schedule</i> .....	20
17. Command: <i>get_schedule</i> .....	20
18. Notify: <i>ScheduleInfo</i> .....	21
19. Command: <i>reboot</i> .....	21
<b>HANDLING THE NUMBERS</b> .....	<b>23</b>
Summation and Demand Readings.....	23
Price Readings .....	23

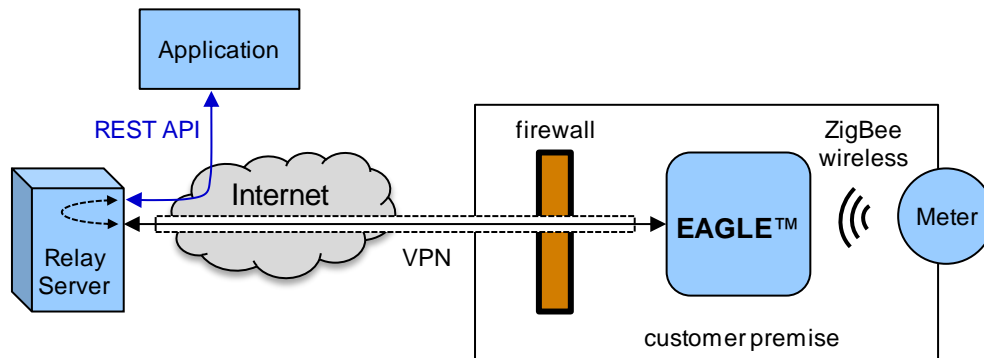
## OVERVIEW

### EAGLE™ REST Interface

The **EAGLE™** is an Ethernet device that communicates with a smart meter over a secured ZigBee wireless network. The **EAGLE™** is an endpoint on the ZigBee network that is authorized and authenticated to communicate with the smart meter. The **EAGLE™** is also an endpoint on an Ethernet network that uses HTTP (Hypertext Transfer Protocol) over TCP/IP (Transmission Control Protocol/Internet Protocol) to communicate with web-enabled entities. The REST (Representational State Transfer) API (Application Programming Interface) described in this document provides a mechanism to allow external applications to “pull” smart meter data from the **EAGLE™**.

### Communications Model

The **EAGLE™** is a web-enabled device that sits on an Ethernet network and communicates with an external Relay Server using a VPN connection which is initiated by the **EAGLE™**. Applications can connect to the Relay Server using the REST API, and the Relay Server will route commands from the Application to the **EAGLE™**, and will route notifications from the **EAGLE™** to the Application.



Applications that connect in this way can effectively communicate with the **EAGLE™** using 8-bit Extended ASCII characters (code page 1252) formed into HTTP POST requests. The body of these POST requests contains XML (eXtensible Markup Language) fragments. These XML fragments contain Commands for the **EAGLE™**.

The Relay Server responds to POSTs from the Application with valid HTTP responses. The body of these responses contains XML fragments that make up Notifications from **EAGLE™**, which are in response to the Commands sent by the Application.

The **EAGLE™** is identified by using its Cloud ID, which is made up of the last 6 digits of the Ethernet MACID that is shown on the label on the underside of the device. In order to be accessed remotely through the Relay Server, the **EAGLE™** must be registered with a Cloud Account on [rainforestcloud.com](http://rainforestcloud.com). Instructions for this registration can be found in the *EAGLE™ User Manual, version 2.20*.

The registration process will associate a user email address and password with the **EAGLE™**. These will be needed to access the **EAGLE™** through the Relay Server.

The Relay Server connection has the following characteristics:

- Host: rainforestcloud.com
- Port: 9445
- Protocol: HTTPS
- URL: /cgi-bin/post\_manager

The **EAGLE™** is also a ZigBee device. It is ZigBee Smart Energy 1.x compliant, and is certified by the ZigBee Alliance to operate according to that standard. Therefore, the API options are restricted to what is allowed by the ZigBee Smart Energy 1.x standard.

The **EAGLE™** must be authorized and authenticated by the ZigBee Coordinator before the **EAGLE™** can communicate with the smart meter. Generally, the smart meter is also the ZigBee Coordinator. In this case, the **EAGLE™** is authorized by the owner of the smart meter (i.e. the electric utility); the owner needs the MAC ID and Install Code for the **EAGLE™** in order to set up the authorization.

## Data Structures

### 1. Commands

The Application sends Commands in HTTP POST requests. POST requests have the following structure:

```
POST <URL> HTTP/1.0
<headers>
<blank>
<body>
```

Where:

- Every line ends with the carriage return and line feed characters (0x0D, 0x0A).
- <URL> is the Uniform Resource Locator (web address) of the Relay Server.
- <headers> are a variable number of HTTP headers; each header is on its own line.  
The following items must be included in the headers:
  - **Cloud-ID: xxxxxx**  
where "xxxxxx" is the 6-digit Cloud ID for the target **EAGLE™**.
  - **User: user\_name**  
where "user\_name" is the user email address registered with this **EAGLE™** on [rainforestcloud.com](http://rainforestcloud.com).
  - **Password: user\_password**  
where "user\_password" is the user password registered with this **EAGLE™** on [rainforestcloud.com](http://rainforestcloud.com).
- <blank> is a blank line, consisting only of the carriage return and line feed characters (0x0D, 0x0A).
- <body> is the main text of the POST request, which has the structure shown below.

The body of the POST consists of XML Fragments. An XML Fragment is a stripped down XML Element. The **EAGLE™** uses XML Fragments to simplify the parsing of the data stream, while providing a data structure that is flexible and human readable.

The XML Fragments have the following structure:

```
<tag>
  <element>value</element>
  ...
</tag>
```

Where:

- Every line ends with the carriage return and line feed characters (0x0D, 0x0A).
- <tag> is the start tag for the XML Fragment; each type will have a unique tag name;
- <element> is the start tag for an element; there will be one or more child elements in the fragment; each element will have a unique element name.
- ... indicates the variable number of specific elements

Element values can be of various types:

- {string} indicates an element consisting of Extended ASCII text
- {enumeration} indicates an element that can have a specific list of values.
- 0xFFFFF indicates an element consisting of a base16 (hex) number
- 00 indicates an element consisting of an integer
- 000.000 indicates an element consisting of a signed decimal number

[<element>] – square brackets indicate optional elements.

value1|value2|value3 – vertical bars separate valid values in an enumeration list.

Note that element names are case insensitive; the case is used strictly for legibility. The **EAGLE™** will ignore case when receiving POST requests.

### Example

Here is an example of a POST request:

```
POST /sample.php HTTP/1.0
Host: 192.168.11.3:8888
Accept: */*
Content-Length: 55
Content-Type: text/xml
Cloud-Id: 00ce69
Password: my123password
User: me@my_email.com

<Command>
<Name>get_instantaneous_demand</Name>
<MacId>0x00178d0000000004</MacId>
</Command>
```

Note that every line in the above example actually ends with the carriage return and line feed characters (0x0D, 0x0A). These are not shown explicitly for clarity.

## 2. Notifications

The **EAGLE™** generates a valid HTTP response to each POST request. These look like:

```
HTTP/1.0 <code>
<headers>
<blank>
<body>
```

Where:

- Every line ends with the carriage return and line feed characters (0x0D, 0x0A).
- <code> is an HTTP status code, which consists of a 3-digit number and a short text phrase. This is usually “200 OK”.
- <headers> are a variable number of HTTP headers; each header is on its own line.
- <blank> is a blank line, consisting only of the carriage return and line feed characters (0x0D, 0x0A).
- <body> is the main text of the response, which contains the Notification, which has the structure shown below.

### Example

Here is an example of a reply:

```
HTTP/1.0 200 OK
Date: Wed, 18 Dec 2013 21:28:44 GMT
Server: Apache/2.2.15 (CentOS)
X-Powered-By: PHP/5.3.3
Content-Length: 379
Connection: close
Content-Type: text/html; charset=UTF-8

<InstantaneousDemand>
<DeviceMacId>0x00158d0000000004</DeviceMacId>
<MeterMacId>0x00178d0000000004</MeterMacId>
<TimeStamp>0x185adc1d</TimeStamp>
<Demand>0x001738</Demand>
<Multiplier>0x00000001</Multiplier>
<Divisor>0x000003e8</Divisor>
<DigitsRight>0x03</DigitsRight>
<DigitsLeft>0x00</DigitsLeft>
<SuppressLeadingZero>Y</SuppressLeadingZero>
</InstantaneousDemand>
```

Note that every line in the above example actually ends with the carriage return and line feed characters (0x0D, 0x0A). These are not shown explicitly for clarity.

### 3. HTTP 1.1

An HTTP POST can also specify that HTTP 1.1 be used. In this case, the reply generated by the **EAGLE™** will contain the header element “Transfer-Encoding: chunked” in place of the “Content-Length” header element. This indicates that the body of the response will be divided into chunks. Each chunk of data will be preceded by the chunk length on a line by itself as a hexadecimal number. Each chunk will also be followed by a blank line. The end of the message will be indicated by a zero on a line by itself.



## 4. JSON

Any of the Commands described in this document can include an optional XML tag: `<Format>JSON</Format>`. This will cause the Notification generated by the **EAGLE™** to be in JSON (JavaScript Object Notation) format. If no Format tag is found, the **EAGLE™** will use the default XML format.

### Example

```
POST /sample/post_manager HTTP/1.1
Host: server.rainforestautomation.com
Accept: */*
Content-Type: text/xml
Content-Length: 80
Cloud-Id: 00038b
Password: 123asdf
User: you@your_email.com
Connection: keep-alive
Pragma: no-cache
Cache-Control: no-cache
```

```
<Command>
  <Name>get_network_info</Name>
  <Format>JSON</Format>
</Command>
```

===== RESPONSE =====

```
HTTP/1.1 200 OK
Content-type: text/html
Transfer-Encoding: chunked
Date: Wed, 09 Jul 2014 22:30:23 GMT
Server: lighttpd/1.4.35
```

```
185
{ "Notification"="NetworkInfo",
  "DeviceMacId"="0x00158d00001aba29",
  "InstallCode"="0x91b98cd9c1d8aa9b",
  "LinkKeyHigh"="0xba8a14c201230175",
  "LinkKeyLow"="0x893644f99acc7c45",
  "FWVersion"="1.4.45 (6564)",
  "HWVersion"="3.2.1",
  "Manufacturer"="Rainforest Automation, Inc.",
  "ModelId"="Z109-EAGLE",
  "DateCode"="20120923ABCDEFGH",
  "ImageType"="0x1001",
  "Protocol"="Zigbee"}
```

0

## COMMANDS & NOTIFICATIONS

### 1. Command: `get_network_info`

Send the `get_network_info` command to get information about a network interface on the **EAGLE™**. The **EAGLE™** will send a *NetworkInfo* notification in response.

```
<Command>
  <Name>get_network_info</Name>
  [<Protocol>{enumeration}</Protocol>]
  [<MacId>0xFFFFFFFFFFFFFFFF</MacId>]
</Command>
```

Element	Range	Description
<b>Protocol</b>	ZigBee; Optional	Type of network interface (only ZigBee supported at this time); if not specified, the default is ZigBee
<b>MacId</b>	16 hex digits; Optional	MAC Address of ZigBee radio, if Protocol=ZigBee

### 2. Notification: *NetworkInfo*

*NetworkInfo* notifications provide basic information about an **EAGLE™** network interface.

```
<NetworkInfo>
  <Protocol>{enumeration}</Protocol>
  :
  protocol specific elements
  :
</NetworkInfo>
```

Element	Range	Description
<b>Protocol</b>	ZigBee	Type of network interface (only ZigBee supported at this time)

#### 2a. *NetworkInfo* (Protocol = ZigBee)

```
<NetworkInfo>
  <DeviceMacId>0xFFFFFFFFFFFFFFFF</DeviceMacId>
  <InstallCode>0xFFFFFFFFFFFFFFFF</InstallCode>
  <LinkKeyHigh>0xFFFFFFFFFFFFFFFF</LinkKeyHigh>
  <LinkKeyLow>0xFFFFFFFFFFFFFFFF</LinkKeyLow>
  <FWVersion>{string}</FWVersion>
  <HWVersion>{string}</HWVersion>
  <Manufacturer>{string}</Manufacturer>
  <ModelId>{string}</ModelId>
  <DateCode>{string}</DateCode>
  <ImageType>0xFFFF</ImageType>
  <Protocol>ZigBee</Protocol>
</NetworkInfo>
```

Element	Range	Description
<b>DeviceMacId</b>	16 hex digits	MAC Address of <b>EAGLE™</b> ZigBee radio
<b>InstallCode</b>	16 hex digits	Install Code for <b>EAGLE™</b> ZigBee radio
<b>LinkKeyHigh</b>	16 hex digits	Upper 16 digits of ZigBee radio Link Key
<b>LinkKeyLow</b>	16 hex digits	Lower 16 digits of ZigBee radio Link Key
<b>FWVersion</b>	Text	Firmware Version
<b>HWVersion</b>	Text	Hardware Version
<b>Manufacturer</b>	Text	“Rainforest Automation”
<b>ModelId</b>	Text	“RFA-Z109”
<b>DateCode</b>	YYYYMMDDZZZZZZZZ	Manufacturer’s date code and lot number
<b>ImageType</b>	4 hex digits	ZigBee code image type

### 3. Command: `list_network`

Send the `list_network` command to get information about all of the **EAGLE™** network interfaces. The **EAGLE™** will send a *NetworkList* notification in response.

```
<Command>
  <Name>list_network</Name>
</Command>
```

### 4. Notification: *NetworkList*

*NetworkList* notifications provide a list of *NetworkInfo* notifications, showing all of the network interfaces on the **EAGLE™**, including those connected to the USB port.

```
<NetworkList>
  <NetworkInfo>
    :
    elements
    :
  </NetworkInfo>
  :
  <NetworkInfo>
    :
    elements
    :
  </NetworkInfo>
</NetworkList>
```

## 5. Command: `get_network_status`

Send the `get_network_status` command to get detailed information about the status of a network that the **EAGLE™** is connected to. In response, the **EAGLE™** will send a *NetworkStatus* notification.

```
<Command>
  <Name>get_network_status</Name>
  [<Protocol>{enumeration}</Protocol>]
  [<MacId>0xFFFFFFFFFFFFFFFF</MacId>]
</Command>
```

Element	Range	Description
<b>Protocol</b>	ZigBee; Optional	Type of network interface (only ZigBee supported at this time); if not specified, the default is ZigBee
<b>MacId</b>	16 hex digits; Optional	MAC Address of ZigBee radio, if Protocol=ZigBee

## 6. Notification: *NetworkStatus*

*NetworkStatus* notifications provide detailed information about a network that the **EAGLE™** is connected to.

```
<NetworkStatus>
  <Protocol>{enumeration}</Protocol>
  :
  protocol specific elements
  :
</NetworkStatus>
```

Element	Range	Description
<b>Protocol</b>	ZigBee	Type of network interface (only ZigBee supported at this time)

### 4a. *NetworkStatus* (Protocol = ZigBee)

```
<NetworkStatus>
  <Protocol>ZigBee</Protocol>
  <DeviceMacId>0xFFFFFFFFFFFFFFFF</DeviceMacId>
  <Status>{enumeration}</Status>
  <CoordMacId>0xFFFFFFFFFFFFFFFF</CoordMacId>
  [<Description>{string}</Description>]
  [<StatusCode>0xFF</StatusCode>]
  [<ExtPanId>0xFFFFFFFFFFFFFFFF</ExtPanId>]
  [<ShortAddr>0xFFFF</ShortAddr>]
  [<Channel>00</Channel>]
  <LinkStrength>0xFF</LinkStrength>
</NetworkStatus>
```

Element	Range	Description
<b>DeviceMacId</b>	16 hex digits	MAC Address of <b>EAGLE™</b> ZigBee radio
<b>Status</b>	Initializing   Network Discovery   Joining   Join: Fail   Join: Success   Authenticating   Authenticating: Success   Authenticating: Fail   Connected   Disconnected   Rejoining	Indicates the current state of the <b>EAGLE™</b> ZigBee radio.
<b>CoordMacId</b>	16 hex digits	MAC Address of Meter
<b>Description</b>	Text; Optional	Description of ZigBee radio.state
<b>StatusCode</b>	2 hex digits; Optional	Status code for the current state
<b>ExtPanId</b>	16 hex digits; Optional	Extended PAN ID of the ZigBee network
<b>ShortAddr</b>	4 hex digits; Optional	The short address assigned to the <b>EAGLE™</b> by the network coordinator
<b>Channel</b>	11 – 26; Optional	Indicates the radio channel on which the <b>EAGLE™</b> is operating
<b>LinkStrength</b>	0x00 – 0x64	Indicates the strength of the radio link

## 7. Command: `get_instantaneous_demand`

Send the `get_instantaneous_demand` command to get the real time demand from the meter. The **EAGLE™** will send an *InstantaneousDemand* notification in response.

```
<Command>
  <Name>get_instantaneous_demand</Name>
  <MacId>0xFFFFFFFFFFFFFFFF</MacId>
</Command>
```

Element	Range	Description
<b>MacId</b>	16 hex digits	MAC Address of <b>EAGLE™</b> ZigBee radio

## 8. Notify: *InstantaneousDemand*

*InstantaneousDemand* notification provides the current consumption rate as recorded by the meter. Note that readings are recorded as integers and are converted into a decimal number by using the multiplier and divisor, i.e., Demand Reading = demand value X multiplier / divisor.

```
<InstantaneousDemand>
  <DeviceMacId>0xFFFFFFFFFFFFFFFF</DeviceMacId>
  <MeterMacId>0xFFFFFFFFFFFFFFFF</MeterMacId>
  <TimeStamp>0xFFFFFFFF</TimeStamp>
  <Demand>0xFFFFFFFF</Demand>
  <Multiplier>0xFFFFFFFF</Multiplier>
  <Divisor>0xFFFFFFFF</Divisor>
  <DigitsRight>0xFF</DigitsRight>
  <DigitsLeft>0xFF</DigitsLeft>
  <SuppressLeadingZero>{enumeration}</SuppressLeadingZero>
</InstantaneousDemand>
```

Element	Range	Description
<b>DeviceMacId</b>	16 hex digits	MAC Address of <b>EAGLE™</b> ZigBee radio
<b>MeterMacId</b>	16 hex digits	MAC Address of Meter
<b>TimeStamp</b>	Up to 8 hex digits	UTC Time (offset in seconds from 00:00:00 01Jan2000) when demand data was received from meter.
<b>Demand</b>	Up to 6 hex digits	The raw instantaneous demand value
<b>Multiplier</b>	Up to 8 hex digits	The multiplier; if zero, use 1
<b>Divisor</b>	Up to 8 hex digits	The divisor; if zero, use 1
<b>DigitsRight</b>	Up to 2 hex digits	Number of digits to the right of the decimal point to display
<b>DigitsLeft</b>	Up to 2 hex digits	Number of digits to the left of the decimal point to display
<b>Suppress LeadingZero</b>	Y   N	Y: Do not display leading zeros N: Display leading zeros

## 9. Command: *get\_price*

Send the **get\_price** command to get price information from the meter. The **EAGLE™** will send an *PriceCluster* notification in response

```
<Command>
  <Name>get_price</Name>
  <MacId>0xFFFFFFFFFFFFFFFF</MacId>
</Command>
```

Element	Range	Description
<b>MacId</b>	16 hex digits	MAC Address of <b>EAGLE™</b> ZigBee radio

## 10. Notify: *PriceCluster*

*PriceCluster* notification provides the current price in effect in the meter. If the meter price is not set, then the price returned is zero.

```
<PriceCluster>
  <DeviceMacId>0xFFFFFFFFFFFFFFFF</DeviceMacId>
  <MeterMacId>0xFFFFFFFFFFFFFFFF</MeterMacId>
  <TimeStamp>0xFFFFFFFF</TimeStamp>
  <Price>0xFFFFFFFF</Price>
  <Currency>0xFFFF</Currency>
  <TrailingDigits>0xFF</TrailingDigits>
  <Tier>00</Tier>
  [<TierLabel>{string}</TierLabel> |
  <RateLabel>{string}</RateLabel>]
</PriceCluster>
```

Element	Range	Description
<b>DeviceMacId</b>	16 hex digits	MAC Address of <b>EAGLE™</b> ZigBee radio
<b>MeterMacId</b>	16 hex digits	MAC Address of Meter
<b>TimeStamp</b>	Up to 8 hex digits	UTC Time (offset in seconds from 00:00:00 01Jan2000) when price data was received from meter or set by user
<b>Price</b>	Up to 8 hex digits	Price from meter or set by user; will be zero if no price is set
<b>Currency</b>	Up to 4 hex digits	Currency being used; value of this field matches the values defined by ISO 4217
<b>TrailingDigits</b>	Up to 2 hex digits	The number of implicit decimal places in the price. (e.g. 2 means divide Price by 100).
<b>Tier</b>	1 – 5	The price Tier in effect.
<b>RateLabel</b>	Text; Optional	Rate label for the current price tier; will be “Set by User” if a user-defined price is set

## 11. Command: *get\_message*

Send the **get\_message** command to get the current text message from the meter. The **EAGLE™** will send a *MessageCluster* notification in response.

```
<Command>
  <Name>get_message</Name>
  <MacId>0xFFFFFFFFFFFFFFFF</MacId>
</Command>
```

Element	Range	Description
<b>MacId</b>	16 hex digits	MAC Address of <b>EAGLE™</b> ZigBee radio

## 12. Notify: *MessageCluster*

*MessageCluster* notifications provide the current text message from the meter. If a confirmation is required, the ConfirmationRequired flag is set. If the user has already confirmed the message, then the Confirmed flag is set to Y. The ID is the reference to a particular message. The message text is HTML escape encoded.

```
<MessageCluster>
  <DeviceMacId>0xFFFFFFFFFFFFFFFF</DeviceMacId>
  <MeterMacId>0xFFFFFFFFFFFFFFFF</MeterMacId>
  <TimeStamp>0xFFFFFFFF</TimeStamp>
  <Id>0xFFFFFFFF</Id>
  <Priority>{enumeration}</Priority>
  <Text>{string}</Text>
  <ConfirmationRequired>{enumeration}</ConfirmationRequired>
  <Confirmed>{enumeration}</Confirmed>
  <Read>{enumeration}</Read>
  <Queue>{enumeration}</Queue>
</MessageCluster>
```

Element	Range	Description
<b>DeviceMacId</b>	16 hex digits	MAC Address of <b>EAGLE™</b> ZigBee radio
<b>MeterMacId</b>	16 hex digits	MAC Address of Meter
<b>TimeStamp</b>	Up to 8 hex digits	UTC Time (offset in seconds from 00:00:00 01Jan2000) when message was received from meter
<b>Id</b>	Up to 8 hex digits	Message ID from meter
<b>Priority</b>	Low   Medium   High   Critical	Message priority
<b>Text</b>	Text	Contents of message, HTML encoded: &gt; replaces the > character &lt; replaces the < character &amp; replaces the & character &quot; replaces the " character
<b>Confirmation Required</b>	Y   N	Y: a user confirmation is required; N: a user confirmation is not required (default)
<b>Confirmed</b>	Y   N	Y: the user confirmation has been sent; N: the user confirmation has not been sent (default)
<b>Read</b>	Y   N	Y: message has been viewed by user; N: message has not been viewed by user
<b>Queue</b>	Active   Cancel Pending	Active: Indicates message is in active queue Cancel Pending: Indicates message is in cancel pending queue



### 13. Command: confirm\_message

Send the **confirm\_message** command to have the **EAGLE™** confirm the message as indicated by the ID. To verify that the message confirmation was sent, use a **get\_message** command. The resulting *MessageCluster* notification should show Confirmed=Y.

```
<Command>
  <Name>confirm_message</Name>
  <MacId>0xFFFFFFFFFFFFFFFF</MacId>
  <Id>0xFFFFFFFF</Id>
</Command>
```

Element	Range	Description
<b>MacId</b>	16 hex digits	MAC Address of <b>EAGLE™</b> ZigBee radio
<b>ID</b>	0x0 – 0xFFFFFFFF	Message ID to confirm

### 14. Command: get\_current\_summation

Send the **get\_current\_summation** command to get the total consumption to date as recorded by the meter. The **EAGLE™** will send a *CurrentSummation* notification in response.

```
<Command>
  <Name>get_current_summation</Name>
  <MacId>0xFFFFFFFFFFFFFFFF</MacId>
</Command>
```

Element	Range	Description
<b>MacId</b>	16 hex digits	MAC Address of <b>EAGLE™</b> ZigBee radio

### 15. Notify: CurrentSummation

*CurrentSummation* notification provides the total consumption to date as recorded by the meter. Note that readings are recorded as integers and are converted into a decimal number by using the multiplier and divisor, i.e., Summation Reading = summation value X multiplier / divisor.

```
<CurrentSummation>
  <DeviceMacId>0xFFFFFFFFFFFFFFFF</DeviceMacId>
  <MeterMacId>0xFFFFFFFFFFFFFFFF</MeterMacId>
  <TimeStamp>0xFFFFFFFF</TimeStamp>
  <SummationDelivered>0xFFFFFFFF</SummationDelivered>
  <SummationReceived>0xFFFFFFFF</SummationReceived>
  <Multiplier>0xFFFFFFFF</Multiplier>
  <Divisor>0xFFFFFFFF</Divisor>
  <DigitsRight>0xFF</DigitsRight>
  <DigitsLeft>0xFF</DigitsLeft>
  <SuppressLeadingZero>{enumeration}</SuppressLeadingZero>
</CurrentSummation>
```

Element	Range	Description
<b>DeviceMacId</b>	16 hex digits	MAC Address of <b>EAGLE™</b> ZigBee radio
<b>MeterMacId</b>	16 hex digits	MAC Address of Meter
<b>TimeStamp</b>	Up to 8 hex digits	UTC Time (offset in seconds from 00:00:00 01Jan2000) when data was received from meter.
<b>Summation Delivered</b>	Up to 8 hex digits	The raw value of the total summation of commodity delivered from the utility to the user.
<b>Summation Received</b>	Up to 8 hex digits	The raw value of the total summation of commodity received from the user by the utility.
<b>Multiplier</b>	Up to 8 hex digits	The multiplier; if zero, use 1
<b>Divisor</b>	Up to 8 hex digits	The divisor; if zero, use 1
<b>DigitsRight</b>	Up to 2 hex digits	Number of digits to the right of the decimal point to display
<b>DigitsLeft</b>	Up to 2 hex digits	Number of digits to the left of the decimal point to display
<b>Suppress LeadingZero</b>	Y   N	Y: Do not display leading zeros N: Display leading zeros

## 16. Command: get\_history\_data

Send the **get\_history\_data** command to get a series of summation values over an interval of time. In response, the **EAGLE™** will send a *HistoryData* notification containing a series of *CurrentSummation* fragments – one for each sample over the interval.

```
<Command>
  <Name>get_history_data</Name>
  <MacId>0xFFFFFFFFFFFFFFFF</MacId>
  <StartTime>0xFFFFFFFF</StartTime>
  [<EndTime>0xFFFFFFFF</EndTime>]
  [<Frequency>0x0000</Frequency>]
</Command>
```

Element	Range	Description
<b>MacId</b>	16 hex digits	MAC Address of <b>EAGLE™</b> ZigBee radio
<b>StartTime</b>	Up to 8 hex digits	UTC Time (offset in seconds from 00:00:00 01Jan2000) of the start of the history interval. If StartTime is older than the oldest sample, then the interval will start from the oldest sample.

<b>EndTime</b>	Up to 8 hex digits; Optional	UTC Time (offset in seconds from 00:00:00 01Jan2000) of the end of the history interval. If not specified, EndTime will be the current time.
<b>Frequency</b>	4 hex digits; Optional	Requested number of seconds between samples. Availability limited by what has been collected by <b>EAGLE™</b> . Default is all of the existing samples in the interval.

### 17. Notify: *HistoryData*

A *HistoryData* notification contains a series of elements; each element is a *CurrentSummation* fragment. It is sent in response to a **get\_history\_data** command.

```

<HistoryData>
  <CurrentSummation>
    <DeviceMacId>0xFFFFFFFFFFFFFFFF</DeviceMacId>
    <MeterMacId>0xFFFFFFFFFFFFFFFF</MeterMacId>
    <TimeStamp>0xFFFFFFFF</TimeStamp>
    <SummationDelivered>0xFFFFFFFF</SummationDelivered>
    <SummationReceived>0xFFFFFFFF</SummationReceived>
    <Multiplier>0xFFFFFFFF</Multiplier>
    <Divisor>0xFFFFFFFF</Divisor>
    <DigitsRight>0xFF</DigitsRight>
    <DigitsLeft>0xFF</DigitsLeft>
    <SuppressLeadingZero>{enumeration}</SuppressLeadingZero>
  </CurrentSummation>
  :
  :
  <CurrentSummation>
    <DeviceMacId>0xFFFFFFFFFFFFFFFF</DeviceMacId>
    <MeterMacId>0xFFFFFFFFFFFFFFFF</MeterMacId>
    <TimeStamp>0xFFFFFFFF</TimeStamp>
    <SummationDelivered>0xFFFFFFFF</SummationDelivered>
    <SummationReceived>0xFFFFFFFF</SummationReceived>
    <Multiplier>0xFFFFFFFF</Multiplier>
    <Divisor>0xFFFFFFFF</Divisor>
    <DigitsRight>0xFF</DigitsRight>
    <DigitsLeft>0xFF</DigitsLeft>
    <SuppressLeadingZero>{enumeration}</SuppressLeadingZero>
  </CurrentSummation>
</HistoryData>

```

## 18. Command: set\_schedule

Send the **set\_schedule** command to change how the **EAGLE™** polls the meter. The rate at which each type of meter reading is polled can be set.

```
<Command>
  <Name>set_schedule</Name>
  <DeviceMacId>0xFFFFFFFFFFFFFFFF</DeviceMacId>
  <Event>{enumeration}</Event>
  <Frequency>0xffff</Frequency>
  <Enabled>{enumeration}</Enabled>
</Command>
```

Element	Range	Description
<b>MacId</b>	16 hex digits	MAC Address of <b>EAGLE™</b> ZigBee radio
<b>Event</b>	time   message   price   summation   demand   scheduled_prices   profile_data   billing_period   block_period	Type of meter reading to schedule
<b>Frequency</b>	4 hex digits	Frequency to poll meter, in seconds
<b>Enabled</b>	Y   N	Y: Set this rate for this type of reading N: Disable polling for this type of reading

## 19. Command: get\_schedule

Send the **get\_schedule** command to get the **EAGLE™** scheduler information. The **EAGLE™** will send the *ScheduleInfo* notification in response; or, the **EAGLE™** will send a series of *ScheduleInfo* notifications if the Event field is omitted.

```
<Command>
  <Name>get_schedule</Name>
  <DeviceMacId>0xFFFFFFFFFFFFFFFF</DeviceMacId>
  [<Event>{enumeration}</Event>]
</Command>
```

Element	Range	Description
<b>DeviceMacId</b>	16 hex digits	MAC Address of <b>EAGLE™</b> ZigBee radio
<b>Event</b>	time   message   price   summation   demand   scheduled_prices   profile_data   billing_period   block_period	Type of meter reading to get schedule info for. If this is omitted, then schedule info for all events is requested.

## 20. Notify: *ScheduleInfo*

A *ScheduleInfo* notification provides the frequency at which a certain event is scheduled to happen, and if it is enabled.

```
<ScheduleInfo>
  <DeviceMacId>0xFFFFFFFFFFFFFFFF</DeviceMacId>
  <MeterMacId>0xFFFFFFFFFFFFFFFF</MeterMacId>
  <Event>{enumeration}</Event>
  <Frequency>0x00000000</Frequency>
  <Enabled>{enumeration}</Enabled>
</ScheduleInfo>
```

Element	Range	Description
<b>DeviceMacId</b>	16 hex digits	MAC Address of <b>EAGLE™</b> ZigBee radio
<b>MeterMacId</b>	16 hex digits	Unique MAC Address of meter
<b>Event</b>	time   message   price   summation   demand   scheduled_prices   profile_data   billing_period   block_period	Type of event scheduled
<b>Frequency</b>	4 hex digits	The frequency in seconds the event will be executed
<b>Enabled</b>	Y   N	Y: the scheduled event will execute; N: the scheduled event will not execute.

## 21. Command: **reboot**

Send the **reboot** command to get the **EAGLE™** to restart the specified part of its system.

```
<Command>
  <Name>reboot</Name>
  <MacId>0xFFFFFFFFFFFFFFFF</MacId>
  <Target>{enumeration}</Target>
</Command>
```

Element	Range	Description
<b>MacId</b>	16 hex digits	MAC Address of <b>EAGLE™</b> ZigBee radio
<b>Target</b>	Zigbee   Eagle   All	Part of the device to be restarted: Zigbee – ZigBee radio Eagle – Linux system All – every part of the device

## 22. Command: `get_demand_peaks`

Send the `get_demand_peaks` command to retrieve the largest positive and negative instantaneous demand values ever recorded by the **EAGLE™**. The **EAGLE™** will send a *DemandPeaks* notification in response.

```
<Command>
  <Name>get_demand_peaks</Name>
</Command>
```

## 23. Notify: *DemandPeaks*

A *DemandPeaks* notification provides the largest positive and negative instantaneous demand values ever recorded by the **EAGLE™**.

```
<DemandPeaks>
  <DeviceMacId>0xFFFFFFFFFFFFFFFF</DeviceMacId>
  <PeakDelivered>00.000000</PeakDelivered>
  <PeakReceived>-00.000000</PeakReceived>
</DemandPeaks>
```

Element	Range	Description
<b>DeviceMacId</b>	16 hex digits	MAC Address of <b>EAGLE™</b> ZigBee radio
<b>PeakDelivered</b>	7-digit floating point	Highest value of demand in kW delivered to the premise.
<b>PeakReceived</b>	Negative 7-digit floating point	Largest value of demand in kW received by the grid.

## HANDLING THE NUMBERS

### Summation and Demand Readings

Summation and Demand readings from the meter are reported as hexadecimal integers with formatting instructions to calculate the decimal value.

Here is a typical *InstantaneousDemand* notification:

```
<InstantaneousDemand>
<DeviceMacId>0x00158d0000000004</DeviceMacId>
<MeterMacId>0x00178d0000000004</MeterMacId>
<TimeStamp>0x185adc1d</TimeStamp>
<Demand>0x001738</Demand>
<Multiplier>0x00000001</Multiplier>
<Divisor>0x000003e8</Divisor>
<DigitsRight>0x03</DigitsRight>
<DigitsLeft>0x00</DigitsLeft>
<SuppressLeadingZero>Y</SuppressLeadingZero>
</InstantaneousDemand>
```

The values from this notification are:

- Demand reading = 1738 (hex) = 5944 (decimal)
- Multiplier = 1
- Divisor = 3E8 (hex) = 1000 (decimal)

The actual Demand value is calculated by using the multiplier and divisor:

- $5944 \times 1 / 1000 = 5.944$

If the multiplier or divisor is zero then use a value of one instead.

For Summation, the same process is used, and the multiplier and divisor are used by both the *SummationDelivered* and *SummationReceived* readings in the *CurrentSummation* notification.

The other formatting values (*DigitsRight*, *DigitsLeft*, *SupressLeadingZeros*) are the preferred display settings set by the utility and can be ignored for the purposes of calculating values.

### Price Readings

Price readings from the meter are reported as a hexadecimal integer with a format instruction to place the decimal point.

Here is a typical *PriceCluster* notification:

```
<PriceCluster>
<DeviceMacId>0x00158d00001ab01e</DeviceMacId>
<MeterMacId>0x00078100011cf431</MeterMacId>
<TimeStamp>0x1a462b4d</TimeStamp>
<Price>0x00000007d</Price>
<Currency>0x0348</Currency>
<TrailingDigits>0x03</TrailingDigits>
<Tier>0x01</Tier>
```

---

```
<RateLabel>Set by User</RateLabel>  
</PriceCluster>
```

The values from this notification are:

- Price reading = 7D (hex) = 125 (decimal)
- Trailing Digits = 3
- Currency Code = 348 (hex) = 840 (decimal)

The actual value of the Price is determined by placing the decimal point 3 digits from the right. The Currency Code indicates that the value is in US Dollars (see ISO 4217). So the final price is \$0.125.